WHAT IS CLAIMED IS:

1. A mark detection method with which to detect a mark formed on an object, comprising:

measuring a surface state of an area of said object including, in a predetermined direction, a mark-formed area where said mark is formed and a no-mark area formed on the outside in said predetermined direction of said mark-formed area, said no-mark area having a characteristic compared to other areas; and

extracting, while running a window having a dimension corresponding to said no-mark area and obtaining at least one quantity denoting the surface state of an area in said window moving across said no-mark area having a characteristic based on measurement results through said window in said measuring, an area having a measurement result reflecting said mark based on said at least one quantity varying with position of said window.

2. The mark detection method according to claim 1, wherein said no-mark area consists of two areas on both sides of said mark-formed area along said predetermined direction.

3. The mark detection method according to claim 1, wherein said at least one quantity includes at least one of average and variance of values in a measurement result through said window.

4. The mark detection method according to claim 3, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

5. The mark detection method according to claim 4, wherein said detecting detects a position of said mark in said predetermined direction based on at least one of said average and said variance after removing noise from said measurement result extracted.

6. The mark detection method according to claim 1, wherein said at least one quantity includes at least one of average and variance of integrated values in each of which values in a measurement result through said window are integrated which values are on a respective line perpendicular to said predetermined direction.

7. The mark detection method according to claim 6, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

8. The mark detection method according to claim 7, wherein said detecting detects a position of said mark in

said predetermined direction based on at least one of said average and said variance after removing noise from said measurement result extracted.

9. The mark detection method according to claim 1, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

10. The mark detection method according to claim 1, wherein said surface state includes a state of light from a surface of said object.

11. The mark detection method according to claim 1, wherein said measuring measures a state of a surface of said object, which surface has a plurality of dimensions, and

wherein said extracting extracts an area having said plurality of dimensions and a measurement result reflecting said mark based on measurement results obtained in said measuring.

12. A mark detection method with which to detect a mark formed on an object, comprising:

measuring a surface state of an area of said object including, in a predetermined direction, a mark-formed area inside which a mark area is formed in said

predetermined direction, said mark area having a characteristic compared to other areas; and

extracting, while running a window having a dimension corresponding to said mark area and obtaining at least one quantity denoting the surface state of an area in said window moving across said mark area having a characteristic based on measurement results through said window in said measuring, an area having a measurement result reflecting said mark based on said at least one quantity varying with position of said window.

13. The mark detection method according to claim 12, wherein said at least one quantity includes at least one of average and variance of values in a measurement result through said window.

14. The mark detection method according to claim 13, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

15. The mark detection method according to claim 14, wherein said detecting detects a position of said mark in said predetermined direction based on at least one of said average and said variance after removing noise from said measurement result extracted.

16. The mark detection method according to claim 12, wherein said at least one quantity includes at least one of average and variance of integrated values in each of which values in a measurement result through said window are integrated which values are on a respective line perpendicular to said predetermined direction.

17. The mark detection method according to claim 16, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

18. The mark detection method according to claim 17, wherein said detecting detects a position of said mark in said predetermined direction based on at least one of said average and said variance after removing noise from said measurement result extracted.

19. The mark detection method according to claim 12, further comprising:

detecting a position of said mark in said predetermined direction based on the measurement result of said area extracted in said extracting.

20. The mark detection method according to claim 12, wherein said surface state includes a state of light from a surface of said object.

21. The mark detection method according to claim 12, wherein said measuring measures a state of a surface of said object, which surface has a plurality of dimensions, and

wherein said extracting extracts an area having said plurality of dimensions and a measurement result reflecting said mark based on measurement results obtained in said measuring.

22. A mark detection unit which detects a mark formed on an object, comprising:

a measuring unit which measures a surface state of an area of said object including said mark in a predetermined direction; and

an extracting/computing unit which, while running a window having a dimension corresponding to a specific area on said object having a characteristic different from other areas and obtaining at least one quantity denoting the surface state of an area in said window moving across said specific area having a characteristic based on measurement results through said window by said measuring unit, extracts an area having a measurement result reflecting said mark based on said at least one quantity varying with position of said window.

23. The mark detection unit according to claim 22, further comprising:

a position-computing unit which obtains a position of said mark in said predetermined direction based on the measurement result of said area extracted by said extracting/computing unit.

24. The mark detection unit according to claim 22, wherein said measuring unit comprises an image-pick-up unit which picks up a mark formed on said object, and wherein said measurement result is light intensities of a mark image picked up by said image-pick-up unit.

25. The mark detection unit according to claim 22, wherein said surface state includes a state of light from a surface of said object.

26. The mark detection unit according to claim 22, wherein said specific area is an area where said mark is formed.

27. The mark detection unit according to claim 22, wherein said specific area is an area outside a mark-formed area where said mark is formed.

28. The mark detection unit according to claim 22, wherein said window has a shape corresponding to said specific area having a plurality of dimensions on said object.

29. A mark detection method with which to detect a mark formed on an object, comprising:

measuring a surface state of an area of said object including said mark in a predetermined direction;

extracting, after obtaining first at least one feature-quantity denoting the surface state of each of partitioned areas of said area based on measurement results obtained in said measuring, a predetermined area having a measurement result reflecting said mark based on said first at least one feature-quantity; and

obtaining a second feature-quantity that is different from said first at least one feature-quantity and that denotes a feature of the surface state of said predetermined area based on said measurement result of said predetermined area extracted in said extracting, and detecting a position of said mark in said predetermined direction based on said second feature-quantity.

30. The mark detection method according to claim 29, wherein there is a no-mark area on the outside in said predetermined direction of a mark-formed area where said mark is formed, said no-mark area having a characteristic compared to other areas, and

wherein said extracting runs a window having a dimension corresponding to said no-mark area with defining said plurality of partitioned areas, obtains said first at least one feature-quantity based on measurement results through said window, and extracts

said predetermined area based on said first at least one feature-quantity varying with position of said window.

31. The mark detection method according to claim 30, wherein said no-mark area consists of two areas on both sides of said mark-formed area along said predetermined direction.

32. The mark detection method according to claim 30, wherein said first at least one feature-quantity includes at least one of average and variance of values in a measurement result through said window.

33. The mark detection method according to claim 29, wherein said obtaining and detecting obtains as said second feature-quantity a degree to which the surface state of said predetermined area and a template pattern corresponding to said mark are identical.

34. The mark detection method according to claim 29, wherein there is a mark area on the inside in said predetermined direction of a mark-formed area where said mark is formed, said mark area having a characteristic compared to other areas, and

wherein said extracting runs a window having a dimension corresponding to said mark area with defining said plurality of partitioned areas, obtains said first at least one feature-quantity based on measurement

results through said window, and extracts said predetermined area based on said first at least one feature-quantity varying with position of said window.

35. The mark detection method according to claim 34, wherein said first at least one feature-quantity includes at least one of average and variance of values in a measurement result through said window.

36. The mark detection method according to claim 34, wherein said obtaining and detecting obtains as said second feature-quantity a degree to which the surface state of said predetermined area and a template pattern corresponding to said mark are identical.

37. A mark detection unit which detects a mark formed on an object, comprising:

a measuring unit which measures a surface state of an area of said object including said mark in a predetermined direction;

an extracting/computing unit which, after obtaining first at least one feature-quantity denoting the surface state of each of partitioned areas of said area based on measurement results obtained by said measuring unit, extracts a predetermined area having a measurement result reflecting said mark based on said first at least one feature-quantity; and

a position computing unit which obtains a second

feature-quantity that is different from said first at least one feature-quantity and that denotes a feature of the surface state of said predetermined area based on said measurement result of said predetermined area extracted by said extracting/computing unit, and detects a position of said mark in said predetermined direction based on said second feature-quantity.

38. The mark detection unit according to claim 37, wherein said extracting/computing unit, while running a window having a dimension corresponding to a specific area on said object having a characteristic different from other areas and obtaining said first at least one feature-quantity based on measurement results through said window, extracts said predetermined area based on said first at least one feature-quantity varying with position of said window.

39. The mark detection unit according to claim 38, wherein said window has a dimension corresponding to a no-mark area on the outside in said predetermined direction of a mark-formed area where said mark is formed, said no-mark area having a characteristic compared to other areas.

40. The mark detection unit according to claim 38, wherein said window has a dimension corresponding to a mark area on the inside in said predetermined direction

of a mark-formed area where said mark is formed, said mark area having a characteristic compared to other areas.

41. The mark detection unit according to claim 38, wherein said first at least one feature-quantity includes at least one of average and variance of values in a measurement result through said window.

42. The mark detection unit according to claim 37, wherein said position computing unit has a template pattern corresponding to said mark, and wherein said second feature-quantity includes a degree to which the surface state of said predetermined area and said template pattern are identical.

43. An exposure method with which to transfer a predetermined pattern onto a plurality of divided areas on a substrate as an object, comprising:

detecting a second number of alignment marks out of a first number of alignment marks, which are formed on said substrate and have substantially the same shape, by a mark detection method according to claim 1 to obtain positions on said substrate of said second number of alignment marks and obtaining positions on said substrate of said divided areas; and

transferring said pattern onto said divided areas with aligning said substrate based on positions on said substrate of said divided areas obtained in said

detecting.

44. The exposure method according to claim 43, wherein said plurality of divided areas are arranged in a matrix arrangement on said substrate, wherein said alignment marks include a third number of first alignment marks having substantially the same shape, which are used for alignment with respect to a row-direction of said matrix and a fourth number of second alignment marks having substantially the same shape, which are used for alignment with respect to a column-direction of said matrix, and

wherein said detecting obtains positions on said substrate and in said row-direction of a fifth number of first alignment marks out of said third number of first alignment marks by said mark detection method and obtains positions on said substrate and in said column-direction of a sixth number of second alignment marks out of said fourth number of second alignment marks by said mark detection method, and then obtains positions on said substrate of said divided areas by performing a statistical process on positions in said row-direction of said fifth number of first alignment marks and positions in said column-direction of said sixth number of second alignment marks.

45. An exposure method with which to transfer a predetermined pattern onto a plurality of divided areas

on a substrate as an object, comprising:

detecting a second number of alignment marks out of a first number of alignment marks, which are formed on said substrate and have substantially the same shape, by a mark detection method according to claim 12 to obtain positions on said substrate of said second number of alignment marks and obtaining positions on said substrate of said divided areas; and

transferring said pattern onto said divided areas with aligning said substrate based on positions on said substrate of said divided areas obtained in said detecting.

46. The exposure method according to claim 45, wherein said plurality of divided areas are arranged in a matrix arrangement on said substrate, wherein said alignment marks include a third number of first alignment marks having substantially the same shape, which are used for alignment with respect to a row-direction of said matrix and a fourth number of second alignment marks having substantially the same shape, which are used for alignment with respect to a column-direction of said matrix, and

wherein said detecting obtains positions on said substrate and in said row-direction of a fifth number of first alignment marks out of said third number of first alignment marks by said mark detection method and obtains positions on said substrate and in said column-direction

of a sixth number of second alignment marks out of said fourth number of second alignment marks by said mark detection method, and then obtains positions on said substrate of said divided areas by performing a statistical process on positions in said row-direction of said fifth number of first alignment marks and positions in said column-direction of said sixth number of second alignment marks.

47. An exposure method with which to transfer a predetermined pattern onto a plurality of divided areas on a substrate as an object, comprising:

detecting a second number of alignment marks out of a first number of alignment marks, which are formed on said substrate and have substantially the same shape, by a mark detection method according to claim 29 to obtain positions on said substrate of said second number of alignment marks and obtaining positions on said substrate of said divided areas; and

transferring said pattern onto said divided areas with aligning said substrate based on positions on said substrate of said divided areas obtained in said detecting.

48. The exposure method according to claim 47, wherein said plurality of divided areas are arranged in a matrix arrangement on said substrate, wherein said alignment marks include a third number of first alignment

marks having substantially the same shape, which are used for alignment with respect to a row-direction of said matrix and a fourth number of second alignment marks having substantially the same shape, which are used for alignment with respect to a column-direction of said matrix, and

wherein said detecting obtains positions on said substrate and in said row-direction of a fifth number of first alignment marks out of said third number of first alignment marks by said mark detection method and obtains positions on said substrate and in said column-direction of a sixth number of second alignment marks out of said fourth number of second alignment marks by said mark detection method, and then obtains positions on said substrate of said divided areas by performing a statistical process on positions in said row-direction of said fifth number of first alignment marks and positions in said column-direction of said sixth number of second alignment marks.

49. An exposure apparatus which transfers a predetermined pattern onto divided areas on a substrate, comprising:

a stage unit which moves said substrate along a movement plane; and

a mark detection unit according to claim 22, which detects alignment marks formed in said divided areas on said substrate mounted on said stage unit.

50. An exposure apparatus which transfers a predetermined pattern onto divided areas on a substrate, comprising:

a stage unit which moves said substrate along a movement plane; and

a mark detection unit according to claim 37, which detects alignment marks formed in said divided areas on said substrate mounted on said stage unit.

51. A device manufacturing method including a lithography process, wherein in said lithography process, a predetermined pattern is transferred onto divided areas on a substrate by the exposure method according to claim 44.

52. A device manufacturing method including a lithography process, wherein in said lithography process, a predetermined pattern is transferred onto divided areas on a substrate by the exposure method according to claim 46.

53. A device manufacturing method including a lithography process, wherein in said lithography process, a predetermined pattern is transferred onto divided areas on a substrate by the exposure method according to claim 48.